

[Back to Article](#)[Send to Printer](#)

Technology

[Subscribe to RSS](#)[View all Articles](#)

Bright Future: LEDs Revolutionize Lighting

By Robert Roy Britt, Editorial Director
posted: 17 December 2008 11:11 am ET

You might have noticed energy-efficient LED lights replacing the traditional holiday bulb lights on many store shelves this year. They're not cheap, but the sales pitch is they save energy, cut the risk of fire and last practically forever.

By all accounts, LED lighting has a very bright future, and the future is arriving rapidly as utility companies tout the benefits of LEDs, and individuals and businesses make the switch both for environmental reasons and to save money.

The Christmas tree at New York City's Rockefeller Center switched to LED lights last year. Time Square's New Year's Eve Ball dropped at the start of this year in LED style. Walt Disney World wired Cinderella's Castle with more than 200,000 LEDs, which will save thousands of dollars a year on electricity. Last year the public utility in Anaheim, Calif., offered gift cards at Borders, Starbucks or Home Depot for anyone purchasing LED lights.

In Pittsburgh, a city councilman this month proposed replacing all 40,000 streetlights with LEDs as a cost-saving measure.

You ain't seen nothin' yet, scientists say.

"We are at the verge of a revolution," says E. Fred Schubert, a professor of electrical engineering and physics at Rensselaer Polytechnic Institute in Troy, NY. "There are tremendous opportunities that open up with LED lighting."

Schubert and others expect LED lights to not just replace conventional bulbs but to remake how lighting is done. LED lights could be used to generate a sun-like glow from an entire wall or ceiling while saving money in the process. The lights could last more than a decade before needing replacement.

Best light yet

LED (light emitting diodes) lights first showed up in calculators and digital watches back in the 1970s. They are similar to regular bulbs but have no filament. Their light is generated by electrons moving through a semiconductor material. The use of LEDs has been limited in part by the challenge of producing warm-looking white light and other colors in the spectrum and the fact that they are relatively expensive to produce.

Recent advances have overcome most of the challenges.

LED lights are more rugged, use less energy and give off less heat than other types of lighting, and they don't contain toxic mercury. The National Institute of Standards and Technology
livescience.com/.../081217-led-lights...

and they don't contain toxic mercury. The National Institute of Standards and Technology (NIST) figures LED lights will be twice as energy efficient as compact fluorescent bulbs (CFLs), which have been all the rage lately as replacements for standard incandescent bulbs used for room lighting in the typical home.

Schubert thinks LED lights can be six times more efficient than CFLs. He predicts that widespread use of LEDs over the course of 10 years would save more than \$1 trillion in energy costs and lead to a substantial reduction in emissions of carbon dioxide, the most common greenhouse gas.

Federal researchers agree that LED lighting has a bright future. "Lighting uses 22 percent of the electricity and 8 percent of the total energy spent in the country, so the energy savings in lighting will have a huge impact," said NIST scientist Yoshi Ohno in a statement earlier this year. NIST is working with the U.S. Department of Energy to support its goal of introducing the newfangled lighting as part of a strategy to cut in half the amount of energy used for lighting by the year 2025.

"The LED technology has the potential of replacing all incandescent and compact fluorescent bulbs, which would have dramatic energy and environmental ramifications," said Purdue researcher Timothy D. Sands, whose team earlier this year developed a cheaper way to make LEDs. Sands and his colleagues say LEDs can last up to 15 years.

The true potential of LED has yet to be tapped, however. Rather than just replacing bulbs, the entire way lighting is done needs a transformation, Schubert says.

"Replacement is fine," Schubert states in the journal *Optics Express*. "But we must look beyond the replacement paradigm to see the true benefits of LED lights."

Schubert envisions light switches giving way to light switchboards that control not only the brightness of a light, but its color temperature and hue. Light spectra could be custom-tailored for all wavelengths, accurately matching the sun's light qualities and varying these characteristics according to the time of day, for instance. This could revolutionize indoor agriculture and help night-shift workers and people who are jet-lagged.

Why now?

LEDs have long been used in traffic lights, flashlights, and some architectural lighting. But until about 10 years ago, LEDs could only produce green, red, and yellow light, which limited their use. Then came blue LEDs, which have since been altered to emit white light (albeit with a light-blue hue). Researchers are still working on generating the full spectrum of colors from LEDs.

In 2005, a breakthrough paved the way for LEDs to get beyond the bulb. Researchers found a way to make tiny quantum dots emit white LED light. The dots could be painted onto just about any surface, the electrically excited to produce a desired glow.

Other innovators imagine entire electronic walls and ceilings with interchangeable LED panels so room lightning could be changed as desired.

The use of polarized light from LEDs could also improve computer displays and lower the glare from car headlights, Schubert said.

Or, you might just want to light your Christmas tree with them.

While traditional bulbs on a tree will cost you roughly \$6 to \$10 in electricity for the season, LED lights will run you a mere 13 to 17 cents, according to the Electric Power Research Institute. If everyone in the United States made the switch, both on trees and outdoor holiday lights, the total savings would be \$250 million a year.

- 10 Ways to Green Your Home
- Home Lighting Could Be Wireless Network
- 'Green' Light Bulbs Pack Toxic Ingredient

Robert Roy Britt is the Editorial Director of Imaginova. In this column, The Water Cooler, he takes a daily look at what people are talking about in the world of science and beyond.

[Space](#) | [Animals](#) | [Health](#) | [Environment](#) | [Technology](#) | [Culture](#) | [History](#) | [Strange News](#) | [Videos](#) | [Trivia & Quizzes](#) | [Galleries](#) | [Hot Topics](#) | [Community](#) | [Store](#)



[Site Map](#) | [About Us](#) | [Contact Us](#) | [Privacy Policy](#) | [Terms and Conditions](#) | [Advertise with Us](#) | [DMCA/Copyright](#)

© Imaginova Corp. All rights reserved.